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District is divided into eight *uluses:* 1, the East Khangalas *ulus* has twelve *naslegs*, including fifty-two clans, numbering about 14,500 people; 2, the West Khangalas *ulus* has nineteen *naslegs* which include sixty-seven clans with a population of about 22,000; 3, the Namsky *ulus* has seventeen *naslegs* and eighty-seven clans with a population of 17,550; 4, the Meghinsky *ulus* has sixteen *naslegs*, sixty-eight clans, and a population of 20,036; 5, the Borogon *ulus* has thirteen *naslegs*, forty-five clans, and a population of about 9,700; 6, The Bayagantai *ulus* has nine *naslegs*, 143 clans, and a population of 9,292; 7, the Baturus *ulus* has thirty-one *naslegs*, 107 clans, and 30,335 people; 8, the Dupsun *ulus* has eight *naslegs*, twenty-seven clans, and 7,706 people. The total number of clans in the Yakutsk District is 596 with a population of 131,088 (64,818 men, 66,270 women) showing a surplus of 1,452 women over men, or 0.55 per cent.

In 1927 the Academy of Sciences of Leningrad published, under the editorship of Professor Paul Wittenburg a volume under the title of "*Iakoutie*," meaning the Yakut country. The volume contains 746 pages and includes twenty maps and tables, 78 drawings, nineteen photographs of the country investigated, and sixteen papers by specialists on the history, geo-morphology, geology, soil, fossils, vegetation, fur-hunting, fishing, agriculture, forestry, roads, and other items. In the present publication the writer has utilized the data thus presented.

Climate

The fundamental factors which determine the climate of a country are: its latitude, the relation between land and sea, elevation above sea level and topography, and its situation with reference to adjoining areas of high or low pressure. A glance at a map may give a general idea of the first three factors. We will survey, in detail, the last factor, upon which the other climatic elements depend to a large degree.

Throughout the year, in Yakutsk and Verkhoyansk, we observed only moderate winds or absolute calm. During all seasons, absolute calm is more frequent in the evenings and rare during the day. In Yakutsk May and in Verkhoyansk June is the windiest month. North of Verkhoyansk the velocity of the wind increases with the decrease in altitude. Between Yakutsk and Verkhoyansk the velocity of the wind is eight meters a second and between Verkhoyansk and the Polar Sea ten meters a second.

The following table shows the velocity of wind in Yakutsk at different altitudes:—

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0 km.	1.0 m. a second
0.2 "	3.2 " " "
0.3 "	4.4 " " "
0.5 "	6.5 " " "
0.75 "	7.0 " " "
1.0 "	7.8 " " "
1.25 "	8.4 " " "
1.5 "	8.0 " " "
2.0 "	7.8 " " "
2.5 "	8.2 " " "
3.0 "	8.2 " " "
4–5 "	11.7 " " "

We see, therefore, that up to an altitude of 1.25 kilometers the velocity of winds increases regularly. Between 1.25 and 3 kilometers it remains almost constant.

The prevalent winds in winter, as reported by the meteorological stations of Yakutsk Province, are from the west or southwest, while in Yakutsk northwest and north winds predominate. In summer the predominant winds in Yakutsk Province are in an opposite direction from that of the winter winds and thus the yearly cycle of wind directions has the character of monsoons. In spring and autumn the dominant winds in the Yakut country, especially during March and November, are those of winter; in April the winds are irregular, and in May are characteristic of those prevailing in summer. The October winds approach the winter velocity.

The climate of Yakut Province appears to be excessively continental: during the winter the temperature is extremely low, in summer it is relatively very high. The continentality of climate is most sharply manifested in the so-called "pole of extreme cold" which is a short distance south of Verkhoyansk. There the average temperature for January is −50.1 degrees Centigrade[1] and the average temperature for July is 15.5 degrees Centigrade. Thus the maximum annual range of 65.6 degrees is the greatest observed until now anywhere in the world. Even in the northern borders of the Yakut country, despite the moderating influence of the northern sea, the yearly range of temperature is high.

Speaking of the "pole of extreme cold," we should note that four years ago Professor S. W. Obruchev of Leningrad found much colder places than Verkhoyansk on the Omekon tableland in northeastern Siberia. When Obruchev's party set out on its first exploration they

[1] I myself observed between Verkhoyansk and Verkhoyansk Mountain Ridge a temperature of −69. degrees Centigrade.

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did not anticipate such extreme cold and did not include alcohol thermometers in their equipment. Consequently, they could not take any observations below −35.4 degrees Centigrade, or −48.9 degrees Fahrenheit below zero, the point at which the mercury thermometers froze. They remained frozen, however, for twelve days in November, when it was ascertained, such low temperatures lasted only two or three days at Verkhoyansk. In October it was observed that the daily temperature averaged about nine degrees Fahrenheit below that of Verkhoyansk. The lowest temperature officially recorded for the latter place is −90 degrees Fahrenheit.

If confirmatory data on the temperature relations on the Omekon plateau are gathered later, it will become apparent that the boundaries of the world's coldest regions extend much farther to the southwest than was previously believed, a fact of considerable importance in meteorological studies. Isotherms which were previously disposed in rings around Verkhoyansk will have to be extended to include the region around the Okhotsk Sea.

Verkhoyansk is roughly five hundred miles distant in a northwesterly direction from the newly reported cold spot and well within the Arctic Circle. The new cold area lies slightly below the Circle in the temperate zone.

In order to characterize the very marked temperature changes during the year in Yakutsk Province we give here the extremes of temperature observed at several points:—

	Minimum	Maximum	Range
Olekminsk	−60.1	35.0	95.1
Yakutsk	−64.4	37.9	102.3
Viliuisk	−59.8	35.4	95.2
Verkhoyansk	−69.8	34.2	104.0
Bulun, mouth of Lena	−59.4	29.2	88.6
Kasachye village, mouth of Yana	−52.6	29.0	81.6
Russkoye Ustye, mouth of Indighirka	−53.1	29.6	82.7
Sredne Kolymsk	−58.0	34.2	92.2
Nishne Kolymsk	−49.6	27.6	77.2

The minimum at Verkhoyansk (−69.8) which was observed in February, 1892, has until now been regarded as the absolute minimum wherever noted throughout the world near the earth's surface (see above Obruchev's data on Omekon). That minimum, together with the absolute maximum of 34.2, produces the greatest temperature range, 104.0. The range at Yakutsk (102.3) is only slightly less than that at Verkhoyansk.

2: Jochelson E-5 (1884-1902) 1933 Yakut

132 The low temperatures of Yakut Province are endurable because of the moderate winds.

The most favorable climatic conditions for vegetation are found in the southwestern part of Olekminsk District of the Province and the most unfavorable at the mouth of the Indighirka River.

The very great frosts associated with a slight snowfall result in the freezing of the soil to a considerable depth, so that it does not thaw out during the summer (see above, p. 77).

The following table gives an idea of the temperature in Yakutsk Province and shows also the average day of the first and last frost.

Meteorological Station	Number of days with average diurnal temperature			Average day	
	<0°	>5°	>10°	last frost	first frost
Olekminsk	204	132	101	May–11	Nov.–21
Yakutsk	214	125	95	May–14	Nov.–16
Viliuisk	219	122	95	May–16	Nov.–17
Verkhoyansk	231	108	77	May–24	Nov.– 2
Sredne Kolymsk	234	100	65	May–29	Nov.–10
Nishne Kolymsk	243	90	53		
Bulun	248	88	49		
Kasachye	250	83	36		
Russkoye Ustye	257	61	19		

The table on page 79 show the average monthly temperature and the annual range.

As the thawing and freezing of rivers are chiefly determined by temperature conditions, we will give the data bearing on these phenomena.

Data on the Freezing and Thawing of Rivers

	Thawing	Freezing	Days free from ice
Aldan R. at the mouth of Maya	May 17 (12)	Oct. 26 (12)	162 (11)
Amga R. at Amginsk Village	May 16 (7)	Oct. 20 (7)	150 (5)
Indighirka R. at Russkoye Ustye	June 16 (10)	Oct. 4 (9)	112 (8)
Kolyma R. at Rodchevo	May 24 (9)	Oct. 12 (9)	141 (7)
Kolyma R. at Sredne Kolymsk	May 30 (21)	Oct. 11 (18)	133 (18)
Kolyma R. at Nishne Kolymsk	June 6 (15)	Oct. 5 (17)	121 (14)
Lena R. at Beresovskoye	May 6 (10)	Nov. 4 (10)	173 (9)
Lena R. at Olekminsk	May 19 (24)	Nov. 6 (21)	172 (15)
Lena R. at Yakutsk	May 28 (56)	Oct. 30 (50)	155 (46)
Lena R. at Bulun	June 3 (13)	Oct. 20 (14)	138 (12)
Maya R. at Ust-Maisk	May 15 (12)	Oct. 26 (12)	164 (10)
Olekma R. at Troitskoye	May 17 (11)	Sept. 3 (8)	169 (8)
Viliui R. at Viliuisk	May 22 (19)	Oct. 21 (18)	152 (15)
Viliui R. at Verkhoyansk	May 28 (16)	Oct. 9 (14)	133 (13)
Yana R. at Kasachye	June 3 (6)	Sept. 29 (9)	120 (5)

Average Monthly Temperature and Annual Range

	No. of years observed	January	February	March	April	May	June	July	August	September	October	November	December	Annual Range
Olekminsk	25	-35.5	-28.2	-18.1	-4.9	6.2	15.5	19.4	14.5	6.9	-5.0	-20.9	-32.0	54.9
Ust-Maiskoye	17	-42.0	-35.2	-22.0	-6.4	5.2	14.5	18.3	14.3	6.5	-7.0	-24.1	-36.9	60.3
Yakutsk	77	-43.3	-36.2	-22.9	-8.5	5.2	15.3	19.1	14.9	5.9	-8.5	-28.7	-40.2	62.4
Viliuisk	25	-38.8	-30.9	-20.2	-7.9	4.4	15.1	18.3	14.6	5.3	-8.1	-25.9	-37.0	57.1
Verkhoyansk	38	-50.1	-44.5	-31.0	-12.6	2.4	13.4	15.5	10.9	2.3	-14.6	-36.7	-46.3	65.6
Bulun	7	-40.0	-35.1	-26.5	-15.2	-3.9	8.4	11.5	9.2	1.1	-11.5	-28.9	-35.6	51.5
Kazachye	6	-39.6	-32.6	-26.0	-17.9	-5.0	7.2	11.0	8.4	0.5	-13.4	-27.2	-32.9	50.6
Russkoye Ustye	9	-38.0	-36.1	-30.8	-22.1	-6.7	4.6	10.7	5.7	-0.4	-12.8	-25.4	-33.0	48.7
Nishne Kolymsk	6	-40.0	-34.9	-26.2	-15.8	-2.6	10.1	12.1	8.2	1.4	-13.2	-24.3	-32.2	52.1
Sredne Kolymsk	15	-39.9	-36.0	-27.1	-15.0	-1.0	12.6	14.0	9.7	2.5	-11.2	-27.9	-36.7	53.9
Rodchevo	8	-39.4	-35.9	-27.4	-13.6	2.7	13.2	16.4	10.0	3.2	-10.6	-26.4	-36.2	55.8

2: Jochelson E-5 (1884-1902) 1933 Yakut

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Figures in parentheses give the period of observation in years.

The number of bright days surpasses the number of murky days in January, February, and March, except in Viliuisk and Bulun, where in January and March cloudy days are observed more often than fair ones. October may be regarded as the cloudiest month.

During the winter frosts in Yakutsk Province misty days occur which are particularly frequent in Yakutsk District.

Precipitation is slight in Yakutsk Province. This may be explained by the topography of the country, its remoteness from the Atlantic Ocean, and by the presence on the northwestern shores of the Pacific of mountain ridges on which most of the moisture brought in the warm season from that ocean precipitates. In the latter half of summer, chiefly in August, precipitation is particularly abundant. There is least precipitation at the end of winter and the beginning of spring, particularly in March.

Snow falls more often in October and November, and rain in June and July. In the northern part of the country snow may occur in any month.

The following table shows the average number of days during the year with snow and rain for the localities named below.

Daily Occurrence of Snow and Rain

	Snow	Rain
Olekminsk	76	53
Yakutsk	75	50
Bulun	90	39
Sredne Kolymsk	80	38

The snowfall in Yakutsk Province is insignificant. The heaviest fall occurs in March and attains its maximum in the Kolyma country and its minimum on the shores of the Polar Sea.

The following table shows the average seasonal snowfall in various localities.

Bulun	8	cm.	(October)	to	21	cm.	(April)
Kasachye	6	"	"	"	15	"	(February)
Nishne Kolymsk	8	"	"	"	48	"	(April)
Sredne Kolymsk	11	"	"	"	47	"	(March)
Rodchevo	6	"	"	"	49	"	(March)
Verkhoyansk	6	"	"	"	27	"	(March)
Viliuisk	5	"	"	"	42	"	(March)
Yakutsk	2	"	"	"	37	"	(March)
Olekminsk	3	"	"	"	34	"	(February)

Winter on the Lena-Viliui plain lasts from the end of October to the beginning of April. It is distinguished by the unusual constancy and

2: Jochelson E-5 (1884-1902) 1933 Yakut

intensity of the cold, with temperatures which may drop to –65 degrees. Precipitation generally occurs in the first half of winter. The greatest depth of snowfall averages from 30 to 40 cm., and occasionally may be 70 to 80 cm.

Spring is short, begins late (in the middle of April), and may be characterized by sharp variations in temperature. The precipitation during April and May is greater than in the winter months, but is, nevertheless, negligible.

The most characteristic features of the Yakut summer are: continuous sunshine (up to twenty hours daily); very few clouds; a high degree of sultriness in the middle of the day (up to 39 degrees in the shade) and a considerable fall in temperature during the short night; the period without frost lasts from 115 to 120 days; considerable dryness of the air and slight rainfall, about 30 to 40 mm. per month.

Autumn, like the spring, is very short, lasting but two months (September and October); the range in the variation of temperature is very large and the curve of average diurnal temperature falls sharply in October; precipitation is greatly reduced, as compared with that in summer.

The mean annual temperature varies at different points from –6.8 degrees to –10.7 degrees; the mean temperature of January from –35.5. to –44.8 degrees, of July from 18.3 degrees to 19.4 degrees, that of the three summer months being 16.5 degrees.

The mean annual precipitation for a number of years for various localities ranges from 187 to 271 mm. During the five warm months (May to September) the rainfall is from 130 to 192 mm.

Comparative data show that with respect to the quantity and distribution of precipitation, as well as the temperature of the summer months, the Lena-Viliui plain differs but little from the steppe regions of central Siberia (Chita, Irkutsk, Minusinsk and others) situated much further south. This peculiarity of the climate of the central Yakut country should be particularly borne in mind, as an exaggerated importance has generally been attributed to the severe winter frost. Beyond its purely practical importance for the needs of agriculture, this climatic peculiarity affords a clue to the comprehension of many phenomena in the flora and soil of the country which do not otherwise seem in accord with the usual conception of a territory lying between 62 and 64 degrees north latitude. The duration of the period of warm weather and of the intensity of the summer heat in the region of the Lena-Viliui plain is sufficient to ensure not only the development of a very diversified natural vegetation, but also to render possible the successful growth of cultivated plants having a fairly long period of vegetation.

2: Jochelson E-5 (1884-1902) 1933 Yakut

natural vegetation, but also to render possible the successful growth of cultivated plants having a fairly long period of vegetation.

As a consequence of the continuous extreme winter cold should be noted the universal prevalence through the Lena-Viliui plain of the permanent frozen earth-layer (*merzlota*). The depth to which the soil thaws out varies with the conditions of exposure of the slope, the thickness of the humus stratum of the soil, the character of the humus, the petrographical composition of the soil and the degree of moisture. Likewise of great importance is the composition and character of the vegetation, the meteorological conditions, and the depth of the snow in winter. In 1912 was observed a maximum thaw to a depth of 225 cm. in dry sandy soils under thin pine growth. Dry humus soils thawed out under short grass meadows and meadow-steppes to the depth of 200 cm. Humus and humus-peat soils of moist meadows thawed to a depth of 120–150 cm. In larch forests the permanently frozen layer was encountered at a depth of 75 to 125 cm., the variation being due either to the absence or presence of a moss covering. The soil of swampy peat bogs was always found to be permanently frozen at a depth of 25 to 30 cm. below the surface.

A permanent frozen earth layer has never been found under water. The ice crust formed on the surface of the water is so poor a conductor of heat that it presents an insurmountable barrier to the penetration of low winter temperatures into the depths of the water.

The presence of a permanently frozen substratum must be regarded as a positive agency in conditioning the climate of the Yakut country. In view of the small amount of summer precipitation, toward the close of summer, the entire layer of thawed out soil is very considerably dried up. Such desiccated soil greedily absorbs all the autumn rains. Subsequent frosts rapidly transform all this water supply into crystals of ice, distributed among the particles of the soil. In spring the mantle of snow thaws while the soil remains completely frozen. Owing to the flat surface of the plain the superficial drainage is insignificant, and all the spring water remains *in situ*, and does not percolate through the deeper layers of the soil. During the gradual thawing out of the soil the snow is partly dissipated by evaporation and partly penetrates the soil by following the receding impervious frozen pan. As the upper strata of soil dry, the water collected underneath rises by means of capillary action, and forms a reliable source of moisture for the normal development of vegetation. When this supply is consumed, it is replaced by the last stores of water, which had frozen the preceding autumn in

2: Jochelson E-5 (1884-1902) 1933 Yakut

the deeper strata of the soil, and which become available as the ice thaws. 134 137

Thus, the permanent frozen earth-layer presents a most beneficial means for the conservation and very economical consumption of water, without which the whole extent of the Lena-Viliui plain with its 200 mm. of annual precipitation and its 19 degrees of mean July temperature would be converted into an arid desert, incapable of cultivation and entirely devoid of forest. 132

"Shut off by mountain-chains from the warmer currents of air coming from the south and the south-east, and exposed to the Arctic winds from the north, this immense [79] country has the severest climate in the world, with an extreme temperature varying between +103° and −93° Fahrenheit. The winter commences early. The smaller rivers and the numberless lakes--of which there are said to be 100,000--begin to freeze in September. In the first or second week of October the whole country is covered with snow. The cold increases day by day. The mean temperature of October and November varies between +5° and −22° Fahr.; in the months of December, January and February between −13° and −40° Fahr.; and in March and April between +14° and −22° Fahr. In the middle of the winter the temperature may remain for weeks together below the freezing-point of mercury, and at times will sink to 80° below zero Fahr. Such a low temperature gives a keen and penetrating sharpness to the air, and all life seems to have congealed. The Yakut winter does not rage and roar, as does that of northern Europe, but suppresses all motion. Neither the sun, which only for a few hours appears above the horizon, nor the earth, which is frozen to an unknown depth and in the summer melts only two or three feet, can withstand its power. The constantly growing cold compresses the air more and more, until it finally threatens, as it were, to suffocate all life beneath its weight. The strongest currents of air from the Arctic sea, from the Pacific, or from the immense continental regions lying to the south are unable to move this inert and compressed mass of air. The heaviest storms powerlessly reboundfrom it and, so to speak, become bound

at its feet, [80] being cooled down and assimilated in their turn into the colossal frost-mass, which is sufficient to cool all Siberia during the whole year. This incubus, as with justice it may be termed, lies immovable over the whole country for weeks and months, and if the dry and compressed air did not itself somewhat hinder the radiation of heat, all life would perish beneath the colossus."

9: Stadling--80-81 E-3 (1898) 1901 Yakut
116, 132

"All moisture is pressed out of the atmosphere by this terrible cold, becomes crystallized, and fills the air as a thin, frosty fog, making the moon appear as if surrounded by a silvery ring. And when a faint milky or silvery phosphorescence shines from the polar ice, and the many-coloured flames of the aurora borealis suddenly appear, then the frost is reaching its climax. Perhaps from an instinctive knowledge of the approach of still greater cold, or more probably frightened at the sight of this phenomenon, the Yakut sledge-dogs unite in raising a protracted and hideous howl, which ceases only when the last flames of the northern lights have disappeared. Then every living sound ceases and silence as of the grave prevails, the Yakuts shovel more snow about their huts, and even the smoke has hard work to go up through the chimney and rises only a few feet above the roof.

But the stillness is only apparent. The snow does not creak, it grates and squeaks under foot, and rings like metal; the breath congeals and falls to the ground in the shape of fine ice-crystals. The deep silence of the night is broken only by weird and hideous sounds resembling [81] long-drawn-out moanings and howlings, with now and again a sudden thunder as of a cannonade, from the bursting ice and the rending of the frozen earth."

9: Stadling--81-82 E-3 (1898) 1901 Yakut
116, 132

"In March and April terrible storms prevail. The transition between winter and summer is so suddent that one can hardly speak of spring and autumn. In a couple of weeks the winter is transformed into summer. The snow melts with incredible rapidity, and the water, flowing into valleys, lakes, and rivers, lifts the thick ice, which has been riven into small fragments by the winter cold. In the lakes the ice melts slowly, and the storms which drive it against the shore only crush it little by little. In the rivers, on the other hand, the ice is violently broken up and carried towards the sea by the powerful spring-floods. At first [82] the water is unable to carry with it the huge ice-floes, which in narrow places are heaped up in colossal masses, damming up the river until the barrier is broken, when, carried along with resistless force, it destroys everything in its way, sweeping away earth, rocks, and entire groves of trees, which are mown down like grass. As we descended the Lena in the middle of June gigantic blocks of ice were still lying on the shores of the river, some twenty feet or more above its water-line."

9: Stadling--81 E-3 (1898) 1901 Yakut
116, 132, 192

"In the lakes which do not freeze to the bottom, the ice attains a thickness of 10 feet; in the rivers still more. The ice becomes as hard as stone, its splinters cut the hands like a knife, and if a hard-tempered axe is directed against the stem of a tree its edge breaks into fragments.

The terror of the Yakut winter is increased by its darkness, especially in the northern regions, where the winter night continues for weeks and months. Only in the month of March do 'the horns of the bull of winter begin to break,' as the Yakuts say in their picturesque language. The sun rises higher and higher every day, its rays in the clear air begin to melt the snow on the roofs of houses, while in the shadow the temperature still marks twenty degrees below zero."

9: Stadling--82 E-3 (1898) 1901 Yakut
116, 132

"The summer in Yakutsk is short, only four months in the south and two months in the north; but it is bright and usually warm, indeed in some places the mercury even touches 103° Fahr. on occasion. The ever-frozen soil, which in the neighbourhood of the city of Yakutsk melts to a depth of 3 to 4 feet, and in the northern regions to barely a foot at times, becomes so heated that you can hardly walk barefooted on the sand. The first half of the summer is usually dry, and the plantsthen receive moisture exclusively from the melting soil. If the soil in the autumn has been sufficiently saturated by rain, there will be no lack of this; if not, the crops will fail from drought. During the latter part of the summer the quantity of rain is usually so large that it is difficult to prevent the crops from rotting. Great variations occur also in temperature in summer, thus a northerly storm may in a few hours lower the thermometer from 85° to freezing-point, and snow may fall in July at a distance of fifteen hundred miles south of the Arctic Ocean."

11: Lansdell--296-297 M-3 (1879) 1882 Yakut-1-2
116, 132, 147

"Yakutsk has the credit of being the coldest place upon the face of the earth. The mean temperature of the air is 18·5 Fahrenheit. A degree of cold takes place there every year between the 17th December and 18th February, exceeding 58° below zero. During Mr. Erman's stay the cold reached even 71·5 below zero. Mercury, therefore, is frozen at Yakutsk for [297] one-sixth of the year. An exceedingly warm summer follows this cold winter, and continues from about the 12th May to the 17th September. The ground is then thawed three feet deep, and though the crops rest on perpetually frozen strata, yet they produce fifteen-fold on an average, and in particular places forty-fold*

* It is well known that in the northern parts of Siberia the ground is always frost-bound, but to what depth is not so easily determined. During the stay, however, of Mr. Erman at Yakutsk it happened that a resident was digging a well, down which the man of science went, and pronounced that he found the soil frozen to a depth of 50 feet below the surface. So accustomed, however, do the natives become to the cold, that with the thermometer at unheard-of degrees below freezing point, the Yakute women, with bare arms, stand in the open-air markets, chattering and joking as pleasantly as if in genial spring. Inside their houses, in the heated part of the rooms, they get the temperature up to 65° or 75°; but one day, when the thermometer stood at 9°, Mr.

11: Lansdell--296-297 M-3 (1879) 1882 Yakut-2
116, 132, 147

Erman found the children of both sexes running about quite naked, not only in the house, but even in the open air. In fact, the great cold is not thought a grievance in Siberia, for a man clothed in furs may sleep at night in an open sledge when the mercury freezes in the thermometer; and, wrapped up in his pelisse, he can lie without inconvenience on the snow under a thin tent when the temperature of the air is 30° below zero."

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122 In favorable years the steamboat service extends as far as Kátschuga on the Lena. Sometimes, however, the latter is so shallow that the steamboats can scarcely reach Kirensk. They belong to the gold washers and are exclusively intended for transporting the supplies needed for the gold washings either down the Lena or in part also from Jakutsk /Yakutsk/ to the residences, as the depots are called here. In the summer all the post traffic takes place on the Lena in boats. Only from Kátschuga to Shigálowa /Zhigalovo/, a station before Ustjilgínskaja, does a post road lead along the bank, and from there downward only a bridle path runs along the bank. The post boats are quite comfortable and protected from the rain by a covering, not to be compared, of course, with the vessels provided with well-furnished cabins in use among the local gold washers and
•[132] merchants. Only the deep snow represented an obstacle to our present winter journey, a consequence of the exceedingly mild winter, for whereas otherwise at the beginning of January here the freezing of mercury is the order of the day, we for the most part traveled in temperatures of -10° R., and even higher, and only once, at night, did it reach -25° R.; consequently the snowfall was a much heavier one this winter, since otherwise in the greatest part of Siberia it occurs almost solely during the transitional period from autumn to winter. At the station of Bajandájewskaja, between Irkutsk and Kátschuga, we were even told that on December 28 several thunderclaps were heard. /17/ Winter storms, as is well known, are a rather frequent phenomenon in Western Europe, but a very rare one in Siberia.

Another inconvenience was the steep up-and-down traveling to and from the stations, since the bank of the Lena is quite high at most places. The trip itself generally took place on the ice cover of the Lena, only here and there on solid land in order to cut off the exceedingly large bends; sometimes, too, places made dangerous because of surface water /Aufwasser/ were
[132] detoured. I shall have an opportunity later to speak about this, as well as the so-called Aufeisbildungen /surface ice formations/ (náledj or nákipĕnje), which are a great obstacle to all winter travel in Siberia.

The two Tungus accompanying us made
T /174 cont./ peculiar faces at
123 this story, for such is not known in their country. They evidently considered these people terrible liars, or, if everything that they said were actually true, great blockheads.

T Y 177 In still another respect we found Chitrow's statements confirmed. That is, he names as inhabitants of the Shigansk /Zhigansk/ district, and especially of the lower Olenék, Russians, Tungus, and Jakuten /Yakut/ and observes that the first two have been completely Jakutized, not only in clothing and customs, but also in language. So far we had met only one Tungus, who, however, actually belonged to the Wiljuisk /Vilyuisk/ district -- to be sure, he was so completely Jakutized that he no longer even understood Tungus; all the other people whom we met called themselves Jakuten. Now we learned from the elder that even his family, Chatygin, which is now considered a true Jakut one, was originally a Tungus one, but has been Jakutized for several generations.

Y 122 On the morning of October 18 we could finally set out on our journey, unfortunately in very bad weather, for a violent southwest wind blew and at any moment the sky threatened snow, which had also fallen abundantly the day before, but we could
Y
● [132] not wait any longer. We had scarcely passed the timber line about ten versts from our balagan when the wind thoroughly shook us; also it began to snow again, the purga, the snowstorm, was ready to start -- still not a wholly genuine one, to be sure. The true purga only begins, as is said here, in the black months, that is, when the sun no longer comes up. When sky and earth are no longer to be distinguished in the chaos of whirling particles of ice, when the raging storm itself is able to blow down lighter buildings, then even one of the natives rarely ventures /175/ out into the dreadful snow-wilderness threatening destruction. Today it was still bearable, especially for Czekanowsky and me, protected by our kibitkas and only sprinkled with powderings of snow on occasional windings of the route. On this day, on account of the bad weather, we covered a distance somewhat shorter than our guide had intended, but still 50-60 versts, and had to wait almost two hours until the men had put up our tschum in a river valley somewhat protected from the wind.

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224 caught in traps, but is also dug out of its den, as we ourselves had
[435] an opportunity to observe on our return journey. The price of a good skin here yields on the average about a ruble, but many different kinds are distinguished according to quality, and the poorer ones are valued at only half a ruble; the winter pelts are, of course, the best. The highly prized blue variety of the arctic fox seems
[651] to be practically unknown here. The crown tax as well as the goods purchased from the merchants are paid for with the skins of the arctic fox.

[543] Around Easter a kind of annual fair is held here, at which appear both the inhabitants of the islands lying in front of the mouth of the Olenék and those from the nearest settlements of the forest region, in order /185/ to trade skins for the necessary commodities
[511] from the traders -- tobacco, tea, cloth, ironware, etc. Despite the inhospitable climate the people here seem to be well off and
[512] very content. Even during the dark months they go about their
[132] activities out in the open, especially fishing, and only about the time of the reappearance of the sun, around the Day of the Holy Three Kings (sixth of January, old style), when the most frightful snowstorms set in, do they shut themselves up completely -- often
342 for a couple of weeks -- in their dwellings. The latter are much
362 more solidly built than in the forest region, in order to offer suf-
313 ficient resistance against the force of the storms. The material for building as well as for heating consists of driftwood which is supplied by the river and even more by the ocean. Besides the
797 merchants, Boljkalák is also visited almost annually by a missionary, who holds services in the chapel here. Chitrow praises the devoutness of the people -- the outward signs of this did not remain unnoticed by us either.

554 On the day after our arrival the elder (stárosta) of the
292 Kangaláss Jakuten /Yakut/ appeared with fresh reindeer for the
123 return journey. He ranked higher than both the local elder and the one accompanying us and wore, as a mark of distinction, a sort of uniform, a yellowish gray cloth coat with red trimming
233 and a gold-embroidered belt with a short sword. The new reindeer, which had to be given a day of rest, and the previous ones

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122 simply could not be accomplished in this season of the year, since a completely uninhabited stretch of land several hundred versts wide lies between Ssiktjach and the southern districts, which one can cross only if the necessary reindeer are distributed at various intermediate stations, but several weeks would be required for that. It was said that even the Bishop of Jakutsk on his last sojourn in the north, after a few days of travel which he made on this direct route, had been obliged to turn back and take the customary route via Bulún and Werchojansk /Verkhoyansk/.

• [132] It is understandable that we resisted as much as possible further traveling in a northerly direction. With the exception of a few hours on the afternoon of November 2 the mercury remained frozen continually, the cold increased to -37° R., and with such a temperature, which, quite apart from the darkness -- for soon the sun would disappear for a few months -- would, of course, prevent almost any observations, however hasty, we were supposed to go out again into the tundra, in the vicinity of the Arctic Ocean, whose terrible snowstorms we had hoped to escape forever. It had to be done, however, and after long hesitation we finally agreed that preparations for our passage along the route to Bulún and Werchojansk should be made, for though there are no settlements there for hundreds of versts, at least comfortable yurts for travelers exist there, and the inhabitants of the surrounding populated tracts of land are equipped to send on the post or one of the officials of this inhospitable district from time to time.

/193/ The few days of our stay in Ssiktjach passed quickly enough with the preparation of our baggage for the further journey. While we packed our collections as well as we could so that they might withstand all the perils of the enormously long journey, we tried to get rid of the other effects insofar as
123 they seemed to us in any way dispensable. There were only a
122 few things, such as shovels, axes, pickaxes, and the like, that Czekanowsky gave to our guide Atschkassow to store in case of his possible return the next year; many other things, such as our

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122 iron stove, which we should no longer need in the yurts, as well
123 as our supplies and kitchen utensils, we presented to our friendly hostess, who could make good use of them. She also wanted to keep our dog Waltusch, but we could not bear to leave our faithful companion on two such difficult expeditions here in this climate obviously unfavorable to him and carried out our resolve to take him back to Irkutsk to his well-earned rest. He is now living out the rest of his days in quiet contemplation with a butcher there. According to the custom of the country, Mrs. Rjeschétnikow insisted on giving us a present in return and provided us with some fine fish for the trip. In addition, Czekanowsky received a Russian-style fur cap, the crown of which was made of dark fox
[291] paws and the brim of river beaver. I was given a Jakut /Yakut/ fur hood, likewise of fox paws and lined with squirrel skins, and a pair of huge mittens of the same kind of fur, beautifully embroidered at the wrists and provided with an opening through which
[171] one could put out one's hand without taking off the mitten. This extremely practical mitten is found /194/ throughout northern Siberia and is to be recommended to European soldiers and hunters.

493 During the cold season persons of rank here travel in com-
(484) pletely covered narten /Russ. narta, "sled"/, into which one crawls
[554] from the front and then, wrapped in soft and warm skins and covers, sleeps through the entire journey. They are so low that sitting up is impossible, and, of course, it is equally impossible to see anything of the region through which one passes -- reason enough for us to forgo this comfort and be content with our narten used up to now, equipped only with a kibitka.

122 On the afternoon of November 5 we took cordial leave of Mrs.
[132] Rjeschétnikow and drove off in a northerly direction, with a temperature of about -33° R., which during the night even dropped to -38° R. On the way we visited the family of our guide Atschkássow, with whom we exchanged a few presents, and on the evening of the following day reached some yurts which bear the name Kűssűr /Kyusyur/ and lie on the right shore of the river, diagonally across from the larger village of Bulún, the chief place on the lower Lena. We chose to stop here because our

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122 governor of Jakutsk /Yakutsk/, who immediately agreed to thank
123 the honest Jakuten /Yakut/ personnally for the help given us. To our great pleasure, our old friend /200/ Atschkássow was assigned to us as courier for the journey as far as the border of the ulússes, and he willingly accepted this decision of his colleagues, although we had already laid claim to his services for such a long time.

We were glad to be able to show our appreciation in some measure at least for the great services rendered to us here by leaving for our friendly hosts the rather considerable remainder of our powder, an article always greatly prized here, but now regarded as especially precious because the annual government shipment of powder had failed to appear this year. Atschkássow, of course, was as richly rewarded as our means allowed. My powder horn, which I believed to be no longer necessary in the continuously prevailing temperature of 30-40° R. below zero, delighted him greatly, and even more a Chinese cap which I had bought in one of the many Chinese stores in Irkutsk. The latter, to be sure, was so unique that it would have attracted attention even in Europe; that is, it consisted of two half-circles of fine brown felt lying one inside the other, which, upon being pulled apart, formed a hollow, egg-shaped body on which one could not detect the tiniest seam. I have been told that these caps, very cheap incidentally -- mine cost one ruble 20 kopecks in Irkutsk -- were made by pressing the mass of felt on a form of ice, which later melts. Any other way of making them is indeed inconceivable.

122 On the morning of November 8, we set out again in a
133 temperature of -35° R. The sun was no longer rising for us on
● [32] that day, but for a long time the southern sky glowed with the most beautiful colors. First we went up the valley of the little river Ebetén, which empties into the Lena not far from Küssür and distinguishes itself unfavorably because of much Aufeis /surface ice/. One /201/ recognizes this by the blue or green color and avoids it whenever possible, for often, under a relatively thin covering of ice, one encounters large hollow spaces or even flowing

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122 Only with difficulty could I now bring myself to make astronomical observations, in spite of the stars shining most brilliantly in this magnificently clear air. The tips of my fingers were in a condition of continually losing skin and after every observation, during which I had to expose them for some time, were so frightfully painful that I -- otherwise not at all very sensitive -- once broke out in loud, nervous weeping and had to be taken back into the yurt almost forcibly by Czekanowsky.

●[132] The most extreme cold during which I made successful observations with a Pistor reflecting circle and mercury horizon was -33.7° R. Since mercury freezes at -32° R., I kept mine in the warm yurt for some time before the observation so that it /204/ would not stiffen too quickly outside. The little needles of ice floating in the air, which cover the instrument and particularly the artificial horizon, are the greatest annoyance during observations; therefore in the most intense cold I could only observe the moon -- the sun, of course, no longer appeared above our horizon -- inasmuch as the images of even the brightest stars were difficult to see and often disappeared at the moment of observation. My respiratory organs also suffered considerably, because I could bring the instrument near my face only by holding my breath.

122 The next day's journey brought us into more cordial regions
123 again. After an eight-hour trip we reached the timber line, after we had come over a ridge into the river basin of the Omoloí (which flows into the Arctic Ocean) and thus had crossed the border of the Shigánsker Ulússes /Zhigansk ulus/. Our pleasure at having again reached the protective forest was dimmed only by the departure of our kind courier Atschkássow, who on the next day accompanied us only on the short distance to the next stan, Dshejelák-Dshaná, where we were to find new guides and

[622] fresh reindeer. We found here an excellent well-heated yurt, the dwelling of one of the wealthiest Jakuten /Yakut/ of the Werchojansk district, Martin Borogón, who at the same time was the community elder and had to provide for our further journey. Unfortunately he himself was on a trip, but he had instructed his

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as well as the completely unanimous statements of the natives.

122 Our further journey, always in a southwesterly direction, went down the valley of the Tass-Apká to where it empties into the Bytantaí River, where the region was already beginning to [132] become more populous. Everywhere we noted traces of human activity, fences and great haystacks; horses and cows roamed about in the open in spite of the snow falling heavily and the [137] prevailing temperature of about -25° R. The woods also began to look more imposing and we were especially pleased to see along the river banks /210/ now and then quite stately, straight, and thickly-branched trees, not seen for a long time. Unfortunately we were quite unexpectedly delayed here. In the stan Tass-Tumssá, which we reached soon after midday, the station manager, or rather his substitute, absolutely refused to grant us the necessary reindeer for our further journey, and he could not be induced to yield either by our official documents and threats that we would have him punished by the isprawnik /ispravnik/ or by the remonstrances of a Jakuten /Yakut/ elder who happened to be present. The latter, since he did not reside here, could only put his own two reindeer at our disposal, and thus it would have been difficult for us to do anything but turn for help to the authorities at Werchojansk /Verkhoyansk/, by which we would have lost several days at least, had not our guide up to here, Iwan Borogón, been kind enough to undertake our further advance to Werchojansk with his own reindeer.

122 On the next day we crossed a mountainous region and climbed 133 three ridges, Kuwaláss, Idomopút, and Kyrá, the middle one of which was quite insignificant, while the two others also seemed to rise only about 700 feet above the last night's lodging, and spent the night in the stan Tykák on the river of the same name, in the valley of which we covered the greatest part of the next day's journey and in doing so, in order to cut off the many bends, traveled sometimes on the one bank, sometimes on the other. [132] After climbing a ridge, Koptolák, rising about 1,000 feet over the immediate surroundings, we stopped at the stan of the same name, where toward the morning of November 17 I again noted

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● 132 a minimum temperature of -37.0° R., at which the mercury in a little bottle that stood beside the thermometer was solidly frozen; since November 5, when /211/ in the vicinity of Ssiktjách the minimum was -38° R., it had become milder, and in the night from November 11 to 12 in Dshejelák-Dshaná in the vicinity of the timber line I had even noted a minimum of only -18.7° R., and at 7:00 on the morning of the twelfth, only -14.5° R., but then it became colder again. When toward midnight I stepped outside the door of the yurt, I also had the opportunity to see a shining meteor moving in a long, fiery path through the stars shining most brilliantly in the intense cold.

122 The next day, November 17, brought us at last to another principal point of our journey, the district town of Werchojansk /Verkhoyansk/, which we reached at an early hour. It lies in the valley of the Jana /Yana/, into which we quickly descended down a fairly steep slope of about 900-1,000 feet from the nearest heights and then drove a while on the river itself.

/212/ Tenth Chapter

~~100~~ Werchojansk /Verkhoyansk/. -- N. S. Goróchow. -- The world's cold pole. -- The isprawnik /ispravnik/. -- Increase in the post tax. -- Antediluvian animal carcasses. -- Garden cultivation. -- Difficulties of the journey. -- Skoptsy. -- Northern lights. -- Arctic boundaries of some forest trees. -- Adventure on the Jana /Yana/. -- M. P. Bereshnow and his caravan. -- Silver ore -- Crossing the Werchojansk /Verkhoyansk/ Range. -- Cold quarters for the night.

122 361 We had not had too high an idea of Werchojansk /Verkhoyansk/, for we had already been very surprised in Turuchansk /Turukhansk/ to find not a single true street such as even the smallest villages located somewhat more to the south exhibit, but rather only individual houses, with quagmires and puddles in between; nevertheless Werchojansk now fell behind even our already very modest expectations. To be sure, it looked cleaner than Turuchansk, for everything was covered with deep snow, but the place was even

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122 Werchojansk, although, as I have just said, scarcely de-
361 serving the name of village, much less that of town, has never-
● 132 theless become well known in the most distant lands, at least to scholars, for, as has been /214/ proved, it is the coldest point on the whole surface of the earth. /The remainder of p. 214, p. 215, and the first two paragraphs of p. 216 are omitted in the translation; see the foreign text. Page 216 continues as follows./

122 In Werchojansk our first interest was the isprawnik, who was to provide for our further journey, but, above all, had to give us an explanation as to why up to this point he had simply done nothing for the expedition. Only the great kindness of the Jakuten /Yakut/ had made it /217/ possible for us to reach Werchojansk; otherwise we would have been in the sad plight of having to winter somewhere in the far north, with our supplies almost entirely exhausted and only very little money, for we could not have counted on help directly from Jakutsk /Yakutsk/ before the next spring. I prefer to omit the name of this noble individual here, for unfortunately I cannot report anything good about him. The governor's orders, to do everything possible in the interests of our expedition, but especially to make arrangements for our unimpeded return journey as soon as we appeared at any point along the Lena -- he had had these orders as early as May, but had simply disregarded them, because, as he very naïvely explained, he did not know what he should do. Even the very obvious thought of notifying the Jakut officials along our route had not occurred to him.

I soon found an explanation for this quite incredible indolence: namely, the good man is supposed to be very addicted to the vice of drink in the well-known Siberian form -- which, incidentally, also occurs here and there in Europe -- sapoï. Those addicted to it drink only periodically, but then in such a way that they are incapable of anything for some time -- the duration of the attack varies from a few days to months and similarly the sober periods are very different, according to the severity of the malady. A characteristic of this sickness, for that is indeed the most accurate designation for it, is the frightful

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171 are many other more or less similar kinds of skins sold as beaver skins -- they are called false beaver.

• 132 Before I acquaint the reader in the following with the most interesting results of the local agriculture, I must first tell him the monthly mean temperatures for Jakutsk /Yakutsk/, derived from observations for almost 35 years, which I am taking from the previously cited work of Academician Wild, Die Temperatur-Verhältnisse des russischen Reichs /The Temperature Conditions of the Russian Empire/ (St. Petersburg, 1881). They are given in Celsius degrees for the months in new style.

Jan.	Feb.	Mar.	Apr.	May	June	July
-42.8	-37.3	-23.7	-9.6	4.5	14.6	18.8

Aug.	Sept.	Oct.	Nov.	Dec.	Year
15.5	5.6	-9.1	-29.8	-40.5	-11.2

The extremes are: maximum 38.8 C. = 31.0 R. in July, and -62.0 C. = -49.6 R. in January. The terrible cold of winter therefore corresponds to a very intense heat during the short summer. In order to characterize this specifically Siberian climate still more, I want to point out that my native city, Riga, which lies at about 57° latitude and has a mean temperature of +6.0 C., is somewhat cooler than Jakutsk in July, and the maxima are never equivalent to the Siberian ones.

241 I can say with complete justice that it is to this eccentric climate that Jakutsk owes its rich harvest of almost all the field crops found farther south. In any case it took great courage to count on such success here and to obtain it by force through years of toil /252/ against all prejudices, and I therefore regard it as my duty to preserve the memory of the name of the first local farmer, which we discovered. He was a discharged junior clerk, later community clerk, Konstantin Andréjewitsch Bolkáschin, whose first efforts are said to date from the year 1819. Not until 1825, on a piece of land worked by his own hands with a hoe, which he sowed with two poods of barley, did he succeed in getting a twenty-fold yield and through that aroused